SIKO User Information

MA503

Electronic Display

EG10

TF+TS
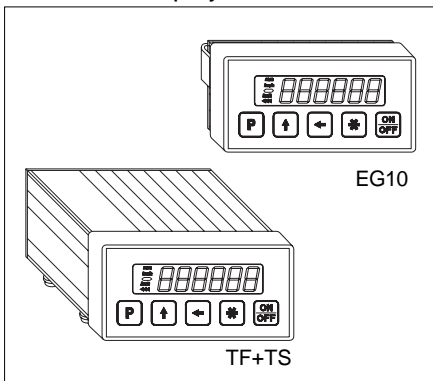
ENGLISH

1. Safety information

In order to carry out installation correctly, we strongly recommend this document is read very carefully. This will ensure your own safety and the operating reliability of the device.

• Your device has been quality controlled, tested and is ready for use. Please respect all warnings and information which are marked either directly on the device or in this document.

• Warranty can only be claimed for components supplied by SIKO GmbH. If electronic display MA503 is used together with other products, the warranty for the complete system is invalid.

• Repairs should be carried out only at our works. If any information is missing or unclear, please contact the SIKO sales staff.

2. Identification

Magnetic strip: identification by printing on the strip.

Example: Magnetic strip "MB"

NNNN ← ○ 5000

— pole pitch: 5mm
— accuracy: 0.1mm
— serial number

	MB	MB5
accuracy	0.1/0.05	0.1
pole pitch	5	5
strip width	10	5

Electronic display: The particular type of unit and type number can be seen from the identification plate. Type number and the corresponding variations are indicated in the delivery documentation.

e.g.   MA503-0023

— type number
— type of unit

3. Installation

The unit sshould only be used according to the protection level provided. Protect the system, if necessary, against environmental influences such as sprayed water, dust, knocks, extreme temperatures, solvents.

3.1 Mounting the magnetic strip

The mounting surface / measuring track must be flat. Buckles or bumps will lead to measuring inaccuracies.

For applications which do not allow properly glueing of the magnetic strip, it can be inserted into a **profile rail** (accessory) - eg. rail type **PS** thus forming a compact mounting unit.

For technical reasons the strip should be approx. 25mm longer than the actual measuring distance.

Attention! To guarantee **optimal adhesion** oil, grease dust etc. must be removed by using cleansing agents which evaporate without leaving residues. Suitable cleansing agents are eg. ketones (acetone) or alcohols; Messrs. Loctite and 3M can both supply such cleansing liquid. Make sure that the surface to be glued is dry and apply the strip with maximum pressure. Glueing should preferably be undertaken at temperatures between 20 to 30° C and in dry atmosphere.

Advice! When applying long pieces of magnetic strip do not immediately remove the complete protective foil, but rather peel back a short part from the end sufficient to fix the strip. Now align the strip. As the protective strip is then peeled back and out press the tape firmly onto the mounting surface. A wall paper roller wheel could be used to assist in applying pressure onto the magnetic strip when fixing it in position.

Mounting steps (see fig. 1)

• Clean mounting surface (1) carefully.

• Remove protective foil (2) from the adhesive side of the magnetic strip (3).

• Stick down the magnetic strip (4).

• Clean surface of magnetic strip carefully.

• Remove protective foil (6) from adhesive tape on the cover strip (5).

• Fix cover strip (both ends should slightly overlap).

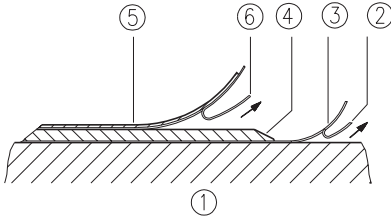• Also fix cover strip's ends to avoid unintentional peeling.

Fig. 1: Mounting of the magnetic strip

⚠ Attention ! Do not expose the system to magnetic fields. Any direct contact of the magnetic strip with magnetic fields (eg. adhesive magnets or other permanent magnets) is to be avoided. Sensor movements during power loss are not captured by the follower electronics.

Mounting examples

Mounting with chamfered ends (fig. 2) is not recommended unless the strip is installed in a safe and protected place without environmental influences. In less protected mounting places the strip may peel. There we recommend mounting accord. to fig. 3 and 4.

Mounting in a groove (fig. 5) best protects the magnetic strip. The groove should be deep enough to totally embed the magnetic strip.
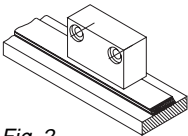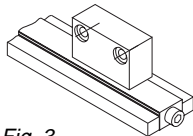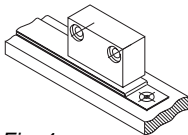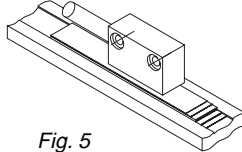

Fig. 2

Fig. 3

Fig. 4

Fig. 5

3.2 Mounting the sensor

⚠ Attention ! MA503 with socket connector for sensors Type **A**, **B**, **F** or **L** to be combined with magnetic tape MB or MB5. Please also read User Instructions supplied with magnetic sensors.

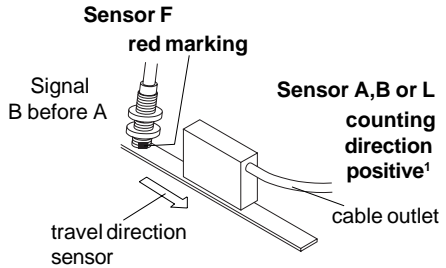Use two M3 screws to fix the magnetic **sensor A** via the ø3.5 mm through holes.

Use two M2.5 screws to fix the magnetic **sensor B** via the two threaded holes.

Magnetic **sensor F** can for example be mounted by using a mounting bracket. For fixing sensor to mounting bracket use bores and the two nuts M8x0.5.

Use two M3 screws to fix the magnetic **sensor L** via the ø 3.2 mm through holes.

• Cable layout should avoid damages due to cable strain or other machine parts. If necessary use a drag chain or protective hose and provide for strain relief.

• **Sensor must be aligned correctly with respect to the counting direction** (see fig. 6).

Sensor F
red marking

Signal
B before A

Sensor A,B or L
counting direction positive[1]

travel direction sensor

cable outlet

[1]Precondition: Parameter 'Counting direction' (_dir_) in programming mode must be programmed to "dn",

Fig. 6: Definition of counting direction / mounting

• When mounting the magnetic sensor, ensure that the gap between strip and sensor and the max. admissable deviation are maintained over the total measuring length! (see fig. 7 and 8)
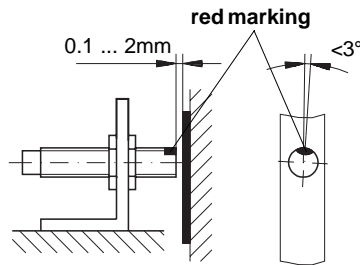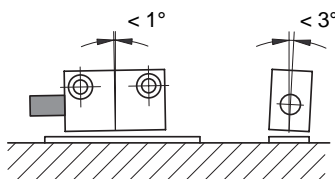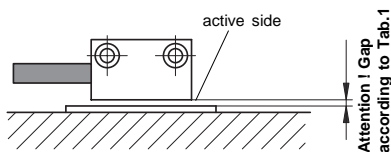

red marking

0.1 ... 2mm

<3°

Fig. 7: Mounting of sensor Typ F

The gap between sensor and magnetic strip should according to the following table.

type of display	gap
EG10	0.1 ... 2 mm
TF	0.1 ... 2 mm
TS	0.1 ... 2 mm

Tab. 1: gap between sensor and magnetic strip

active side

< 1°   < 3°

Max. deviation

< 3°
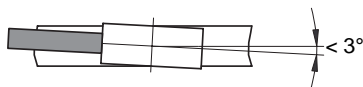
Fig. 8: Mounting of sensor

3.3 Mounting the display

Below are the dimensions for panel mounting:

$44^{+0.5}_{-0}$
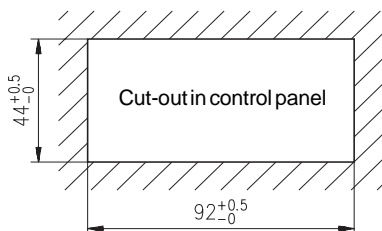
Cut-out in control panel

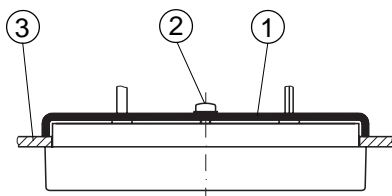$92^{+0.5}_{-0}$

Fig. 9: Panel mounting

③ ② ①

Fig. 10: Mounting EG10

EG10 : Push device into panel (3). Tighten bracket screw on the rear (2). Align device on front plate and tighten screw.

Bench housing TF and TS

The rubber feet can be removed to enable the unit to be screwed down.

⚠ **Attention !** Max. reach of screw is 5.0 mm!

3.4 Mounting of the battery box for EG10

The battery box supplied together with the display are for panel mounting. The battery box should be mounted at a 'cold' site: heat accelerates the self-discharge of batteries.
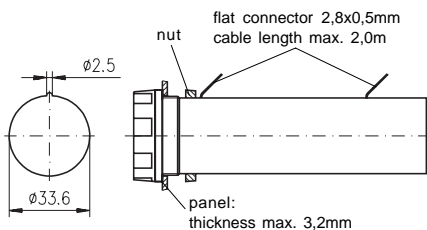
Below are the dimensions for panel mounting:

flat connector 2,8x0,5mm
cable length max. 2,0m

nut

ø2.5

ø33.6

panel:
thickness max. 3,2mm

Fig. 11: Battery box for operating voltage 7 (3Volt , 2xBaby/R14)

4. Electrical connection

• Wiring must only be carried out with power off!

• Provide standed wires with ferrules.

• Check all lines and connections before switching on the equipment.

Interference and distortion

All connections are protected against the effects of interference. **The location should be selected to ensure that no capacitive or inductive interferences can affect the sensor or the connection lines!** Interference can be caused by motors, switch gear, cyclic controls and contactors. Suitable wiring layout and choice of cable can minimise the effects of interference.

The sensor should be positioned well away from cables with interference; if necessary **a protective screen or metal housing** must be provided. The running of wiring parallel to the mains supply should be avoided.

Power supply

The unit is battery-powered. EG10 version has external power supply through connection cable and enclosed battery box. TF and TS casing is with integral battery box.

U_B= **3 VDC** (operating voltage 7 for TF+TS or EG10)

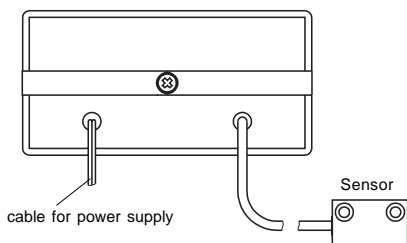| Designation	Color(only for EG10)
+ U_B	red
GND	black

SIKO

Fig. 12: Built-in housing EG10

Connection of the battery box (only for EG10)

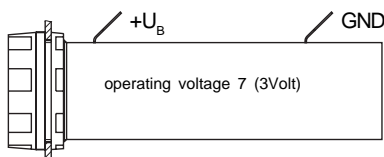The battery box (mounted as described in chapter 3.4) has to be connected as follows:

+U_B   GND

operating voltage 7 (3Volt)

Fig. 13: Connection of the battery box

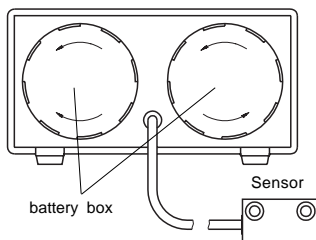battery box   Sensor

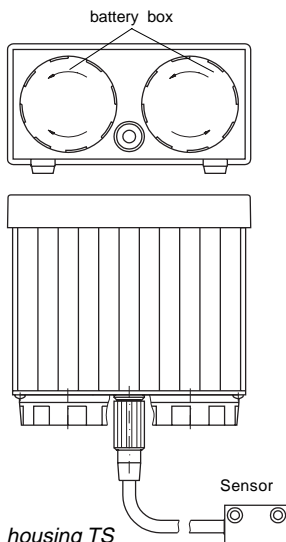*Fig. 14: Bench housing TF*

battery box

Sensor

Fig. 15: Bench housing TS

Display and sensor form one unit and must not be interchanged when used with bench casing TS.

> Bench casing's and connector's device number **must** be identical. ❗

Battery types

Batteries are **not** supplied together with the MA503. The following standard types could be used:

for *operating voltage 7 (3Volt)*:

2 x Baby / R14

Change of batteries

When display shows blinking 'low-batt symbol' **batt** batteries should be exchanged as soon as possible.
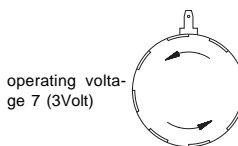
Unscrew cap to insert / remove batteries.

operating voltage 7 (3Volt)

Fig. 16: Change of batteries

> When exchanging the batteries take care that their polarity is correct ! Take the marking on the bottom of the box as orientation. ❗

Sensor connection (if necessary)

via 7-poles rear side socket.

> **Attention!** No modifiction of the sensor connection, eg. by cable extension, is permitted. ❗
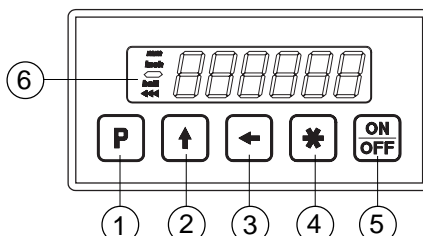
5. Commissioning

Five membrane keys on the front panel are used for programming and operation of the display.

Keys' function

Depending on the operating mode the keys may have additional functions (see 'Programming mode' and 'Input mode'). The keys are pressed singly or in pairs (two together).

1. Programming
2. Select 'value'
3. Select 'digit'
4. Store value
5. ON / OFF
6. Display: battery change /
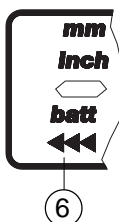incremental measurement
function / sign

Fig. 17: Display and membrane keypad

Switch on

Use key ON/OFF to switch on the display. MA503 runs an auto test sequence and shows the following values:

• all LED segments (for approx. 1 s)
• the software version (eg. 1_03)
• value 0 – now the display is ready for use!
(The last measured value is displayed if the parameter 'Last value memory' is programmed to 'on'.)

Attention ! MA503 does not automatically switch on when the operating voltage is applied.

Switch off

• Press ON/OFF key to switch off the unit (switch-off delayed, if parameter "_4_oFF" has been programmed to "on" before).

• After the last measurement the display switches off automatically (see chapter 8 Parameter '_AUto_ and 'PErIod').

Operating modes

There are two operating modes accessible via the keyboard:

1. Programming mode: to program the display at initial installation.

2. Input mode: to enter parameters/select functions used during standard operation.

6. Programming mode

The display is either pre-programmed to standard values at our works or, if the order defines customer-specific parameters, these will be pre-programmed at SIKO. Enter programming mode for parameter modification / programming. Normally programming is only necessary at initial installation. Parameters can be modified and checked at any time. They are stored in a non-volatile memory. Each parameter's designation, function and value range is shown in tables on the following pages.

To enter into programming mode:
Press key P for at least 5 s

To leave programming mode:
Automatically, if no key has been pressed during approx. 30 s, or press key P until the end of the parameter list is reached.

To scroll parameter information:
Use key P

To change parameters:
Use keys ↑ and ⬅

To store modified parameters:
Press key ●, then message "-SA-" will be briefly displayed.

7. Parameter description

At the end of this user information brochure you will find a detailed **parameter list** showing all programmable parameters and offering space for customer-specific programming values .

(in English, parameter _LAn_ = "E")

Display "choice"	Designation / description
rES	Resolution: Determines the resolution of the display. Parameter "FrEE" allows the programming of a calculating factor.
FAC	Calculation factor (only available, if 'Resolution' has been programmed to "FrEE" before): Used to obtain for example an angle display. Basis is the maximal possible resolution of 1/100 mm. The calculation factor "FAC" which has to be programmed results from: FAC = meas. range / total travel distance [1/100 mm] *Example:* Angle measurement on a circular disk with a display range of 0 ... 180°; display in 1/10°; circumference of the circular disk 942,48 mm; hence total travel distance 471,24 mm; FAC = 1800 / 47124 = 0,38200
rEF	Reference value: Absolute reference point of the measuring system. This value is set by referencing the system according to chapter 8.
oFF	Offset: Can be any value; used to

	influence the value displayed, eg. tool correction value.	**_SPEEd**	To alter power consumption by changing processor´s speed.
_dP_	Decimal point (only available if 'Resolution' has been programmed to 'FrEE' before)**:** Determination of the decimal point according to the resolution.	"HI"	Full processor speed
		"Lo"	Reduced processor speed with low power consumtion
		LAn	Language: to choose the language in which the menu points are to be displayed
dlr	Counting direction of the measuring system: depends on the sensor's mounting position and can be changed subsequently.	"d"	German
		"E"	English

|	
"UP"	Upward
"dn"	Downward
AUto	Switch-off method: State of the automatic switch-off:
"oFF"	no switch-off.
"on"	automatically switch-off
PErlod	Switch-off time : Time since last measurement / sensor move after which the display will switch-off.
_rSto__	Last value memory:
"oFF"	Last value memory off. When switched on, the display must be calibrated (zeroed).
"on"	Last value memory on. When switched on, the last measured value is displayed.
_4_oFF	Delayed switch-off: ON/OFF key must be pressed for approx. 4s to switch off the display.
_F_AbS	Access reset function: resetting to reference value via key 🖲 on front of the display.
"oFF"	Reset function off
"on"	Reset function on
_F_rEL	Access incremental measurement: to switch from absolute dimension and zero-setting to subsequent relative dimension
"oFF"	Increm. meas. function off
"on"	Increm. meas. function on
_F_rEF	Access reference value: to enter / change reference value
"oFF"	Reference value function off
"on"	Reference value function on
_F_oFF	Access offset value: to enter / change offset value
"oFF"	Offset value function off
"on"	Offset value function on

8.   Input mode

Reset function via keyboard

• Press key 🖲 to set the display to the reference value.

> **Precondition:** Parameter 'Reset enable' (_F_AbS) in programming mode must be programmed to "on", but unit must **not** be left in programming mode (see chapter 6 '**To leave** programming mode').

Incremental measurement

Press the two arrow keys ⬆ + ⬇ simultaneously to activate incremental measurement function.

• The display is zeroed.

• The Display shows the blinking ◀◀◀

• Leave incremental measurement function by another simultaneous press of the two arrow keys ⬆ + ⬇ . The absolute measuring value is displayed again.

• While in the incremental measurement mode the display can also be set to zero by pres-sing key 🖲 . This does not change the absolute measurement in the background.

> **Precondition:** Menu point 'Incremental measurement enable' (_F_rEL) in programming mode must be programmed to "on", but unit must **not** be left in programming mode (see chapter 6 ,'**To leave** programming mode').

Reference and/or offset value modification

Press the two keys 🅿 + ⬆ simultaneously to enter a new reference value.

Press the two keys 🅿 + ⬇ simultaneously to enter a new offset value.

The display then shows the reference / offset value, which can be changed via the two arrow keys.

Press key ✳ to store the new value.

If no key has been pressed for approx. 30 s or if you press again key Ⓟ, MA503 will return to display mode.

❗ **Precondition:** In programming mode menu points 'Reference value input enable' (_F_rEF) 'Offset input enable' (_F_oFF) respectively must be programmed to "on", but unit must **not** be left in programming mode (see chapter 6 ,'**To leave** programming mode').

9. Last value memory

Precondition: '_rSto_' = "on"

When switched off the last measured value is stored in a non-volatile memory.

10. Joining magnetic strips together

For some applications it may be necessary to extend the magnetic strip. The magnetic strip can be cut and rejoined using standard tools.

But however carefully this is done the accuracy of the strip at the join will be impaired (error of at least 0,1 ... 0,2 mm).

The following tools / accessories are required:
• magnet magnifier, magnetic foil or metal dust
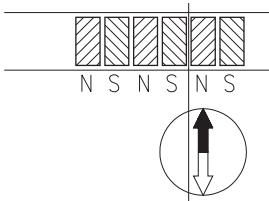• rule or suitable tool
• compass needle

Fig. 18: Determination of the pole position. Cutting the magnetic strip
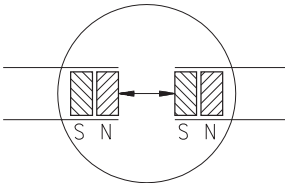

Fig. 19: Determination of the pole position. Joining the magnetic strip

Steps

• If there is a cover strip, this is to be removed first.

• To determine the pole division either use metal dust, a magnet magnifier or magnetic foil.

• If necessary, use a compass needle to determine the location of the poles on the magnetic strip (fig. 18).

• Use a rule and a sharp knife to cut the magnetic strip at a right angle. Then also cut the carrier strip accordingly.

• Previous steps are to be repeated with the other part of strip.

• Check polarity before joining the two parts. Both ends must attract each other (if necessary, use compass needle). In case both ends have the same polarity, shorten one end by a half pole division (fig. 19).

• Join the two ends closely together and add the cover strip.

11. Maintenance of the magnetic strip

We recommend cleaning the magnetic strip's surface from time to time with a soft rag. This avoids dirt (dust, chips, humidity ...) sticking to the strip.

12. Trouble shooting

Error states are recognized and shown in the display:

Message: full
Description: display overrun
Action: check parameters and adjust them if necessary; set display to reference value

Message: display blinking
Description: faulty / no sensor signal
Action: check gap between sensor and magnetic strip

Message: display blinking.
Description: missing referencing.
Action: set display to reference value

Symbol: **batt** blinking
Description: battery voltage below the admissable values.
Action: Change the batterie.

Message / Effect: ◀◀◀ blinking / MA503 cannot be referenced
Description: Display is still in incremental measurement function

Action: Leave incremental measurement function as described in chapter 8 or proceed as follows:
1. Enter into programming mode
2. Program parameter '_FrEL' to "on"
3. Leave programming mode
4. Leave incremental measurement function as described in chapter 8
5. Enter programming mode again
6. Program parameter '_FrEL' to "oFF"
7. Leave programming mode

13. Application Examples

Length measurement

Required: Display accuracy 1/10 mm. Display shall be zeroed via function key

Designation	Display	Progr. value
Resolution	**_rES_**	0.1
Reference value	**_rEF_**	00000.0
Offset	**_oFF_**	00000.0
Decimal point	**_dP_**	0.0
Counting direction	**_dlr_**	UP
Switch-off method	**_AUto_**	oFF
Last value memory	**_rSTo_**	oFF
Delayed switch-off	**_4_oFF**	oFF
Access: reset	**_F_Abs**	on
Access: increm. meas.	**_F_rEL**	oFF
Access: ref. value	**_F_rEF**	oFF
Access: offset	**_F_oFF**	oFF
Processor speed	**_SPEEd**	HI
Language	**_LAn_**	E

Angle measurement

Required: display range 0 ... 360°; display accuracy 1/10° . Display shall be zeroed via function key. Automatically switch-off after 10min.

Conditions: circular disk with Ø 300 mm; resulting total circumference: U = π x 300 mm = 942,48 mm

The programmable factor is calculated as follows: FAC = total display range [1/10°] / circumference [1/100 mm]

$$3600 / 94248 = 0,038200$$

Designation	Display	Progr. value
Resolution	**_rES_**	FrEE
Calculating factor	**_FAC_**	0.03820
Reference value	**_rEF_**	00000.0
Offset	**_oFF_**	00000.0
Decimal point	**_dP_**	0.0
Counting direction	**_dlr_**	UP
Switch-off method	**_AUto_**	on
Switch-off time	**PErIod**	600
Last value memory	**_rSTo_**	oFF
Delayed switch-off	**_4_oFF**	oFF
Access: reset	**_F_Abs**	on
Access: increm. meas.	**_F_rEL**	oFF
Access: ref. value	**_F_rEF**	oFF
Access: offset	**_F_oFF**	oFF
Processor speed	**_SPEEd**	HI
Language	**_LAn_**	E

Appendix: Parameter list

Display	Designation / value range	Standard programm.	your programming
rES	resolution (mm, In=inch) 1, 0.1, 0.05, 0.01, In 0.01, In 0.001, FrEE	0.1	
FAC	calculation factor (only if resolution has been programmed to "FrEE") 0.00001 ... 9.99999	0.00000	
rEF	reference value -999999 ... (+)999999	00000.0	
oFF	offset value -999999 ... (+)999999	00000.0	
_dP_	decimal point (only if resolution has been programmed "FrEE") 0. to 0.000	0.0	
dIR	counting direction UP, dn	dn	
AUto	switch-off method on , oFF	oFF	
PErIod	switch-off time (in minutes)(only for switch-off methods 'on') 009... 999	009	
_rSTo__	last value memory on , oFF	oFF	
_4_oFF	Delayed switch-off: on, oFF	oFF	
_F_AbS	access reset function: on , oFF	on	
_F_rEL	access increm. measurement: on , oFF	oFF	
_F_rEF	access reference value: on , oFF	oFF	
_F_oFF	access offset value: on , oFF	oFF	
_SPEEd	Processor speed: HI , Lo	Lo	
LAn	language d, E	d	

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